

REMARKS

Applicant thanks the Examiner for the Advisory Action mailed April 28, 2009. Entry of the Amendment mailed April 15, 2009 is acknowledged. Additional amendments are made in this amendment and response.

Claim 23 is amended to clarify the meaning of the claim and to include an additional limitation. Support can be found in the specification at paragraph [0057] and Figs. 9a and 9b for the additional limitation. Dependent claims are amended to correct for antecedent basis from claim 23. Claims 40 and 42 are amended to clarify the meaning of the claims.

The Advisory Action does not attempt to combine the references previously recited to show all of the elements and the arrangement of the elements as recited in the pending claims. Instead, the Advisory Action attempts to justify the use of a lower standard than fireproof, even though the FAA Advisory Circular, which would be familiar to any person having ordinary skill in the art, requires that the "...test for demonstrating compliance with the criteria for 'fireproof' and 'fire resistant' materials, components and fittings is to expose the specimen to the required flame temperature and heat flux density for the required time (15 minutes for 'fireproof' and 5 minutes for 'fire resistant')" without exception. This includes both flame penetration and backside ignition. While the Advisory Action focuses on what is "included" in the document, i.e. "...methods for fire testing of materials and components ... in areas adjacent to designated fire zones..." the entire circular is addressed to a voluntary compliance not a mandatory one, and any materials and components may be tested using the method to determine whether such materials and components are "fireproof" or "fire resistant" even if such materials are not required to be tested at all. Nevertheless, if the terms fireproof and fire resistant are used by a person having ordinary skill in the art, it is known that the materials and components must meet or exceed this FAA definition, which is established by Section 1.1 of the Federal Aviation Regulations (FAR).

Item 4 of Advisory Action (Side-by-side honeycombs and Humphries)

The term “side-by-side” is being misinterpreted in the Advisory Action. As discussed in an interview with the Examiner, the term side-by-side does not refer to stacked, one upon the other. Instead, side-by-side refers to the arrangement of the honeycombs cells in a sheet or a plurality of sheets of a single layer one along side the other. Therefore, the reference to the “dampening sheet of vinyl 80 separates honeycomb cores” of Humphries indicates that the office has misinterpreted the meaning of the claims as previously presented. Please contact the Applicant’s undersigned representative to discuss the meaning of the claims as presented in the amendment, if you have questions that are unresolved by these remarks and the remarks in the responses to the previous office actions and the interview.

Definition of Burn-Through-Proof (Item 6 of Advisory Action)

The Advisory Action asserts that “...the interior panel of an aircraft ... is not considered a fire zone according to the FAA.” Applicant traverses this assertion. The term “fire zone” is not defined in the advisory circular previously submitted for reference. In contrast to the assertion in the Advisory Action, the language of claim 23 recites an interior panel “...of an aircraft passenger cabin, with which an outer skin of an aircraft is filled; which arrangement will provide protection against fire....” Thus, the claim, itself, places the interior panel within a fire zone.

Furthermore, the Applicant’s specification makes it clear that the purpose of the claimed insulation is to protect passengers from a fire engulfing the exterior of the aircraft, putting the interior panel directly in a fire zone of the aircraft. In paragraph [0004] of the Applicant’s specification, the Applicant teaches that the Applicant’s invention overcomes the shortcomings of the prior art in a “catastrophic fire” where the “spread of fire through the aircraft fuselage insulation and through the interior panelling of the aircraft would not only be retarded (impeded) but completely prevented.”

The Applicant need not recite a protocol for an industry standard test, such as the one established by the FAA for fireproofness of materials subject to being exposed to fires, because the standard is one that is very well known within the aircraft industry to a person having ordinary skill.

Certainly, Applicant informs a person having ordinary skill in the art that the Applicant's claims are drawn to use of the materials in a "fire zone" as that term is known in the art. As shown previously, the term "burn-through-proof" means fireproof and fireproof would be understood by a person having ordinary skill in the art as being defined according to the FAA's definition of fireproof for materials disposed in a fire zone of an aircraft.

The level of skill of a person having ordinary skill in the particular art must first be determined, and then the meaning of the claim terms are evaluated within the context of what a person having ordinary skill in the art would understand the claim terms to mean. In this case, the background and teachings of the Applicant's specification suggest that the person having ordinary skill in the art would be familiar with the FAA's definition of fireproof, because the entire reason for the claimed inventions are to prevent burn through of a fire external to an aircraft from injuring passengers within the aircraft cabin when the exterior of the aircraft is within a fire zone. *See Applicant's Background.*

Now, looking at the cited references, it is clear from the references that the "flame and fume resistant" standard of Fischer et al. is much lower than the fireproof standard of the FAA as defined by the disclosed advisory circular and as disclosed in the Heitkamp reference cited by the Examiner. A person having ordinary skill in the art would be very familiar with the FAA definition for fireproof and the distinction between the meaning of fireproof within the aircraft industry and the use of the standard low FST (fume, smoke and toxicity) definition in Fischer et al. This is evidenced by the Heitkamp reference cited by the Examiner. Heitkamp defines a fire barrier for a composite honeycomb panel preventing burn-through in an aircraft as requiring 15 minutes at 1093°C (i.e., 2000°F), which is identical to the FAA standard. Indeed, Heitkamp compares this higher flameproof standard to the "standard low FST (flame, smoke and toxicity)" adopted by Fischer et al. and teaches that the phenolic prepreg skins of the prior art (such as Fisher et al.) are inadequate to meet the higher flameproof standard for composite panel structures.

Thus, Applicant rebuts the assertion in the Advisory Action that such a barrier is not in a fire zone and would not be subject to the FAA standard, within the context of the Applicant's specification, because the Applicant expressly teaches that the panel is designed to be in a fire zone during an accident. Heitkamp uses the same FAA definition for honeycomb composite

panel structures in similar circumstances, and the Applicant respectfully suggests that the definition of fireproof, according to the FAA definition, is supported by overwhelming evidence in the record. Therefore, Applicant traverses the statement in paragraph 6 of the Advisory Action interpreting "fireproof" as meaning only "flame-and-fume resistant" within the context of Fischer et al., which is known to a person having ordinary skill in the art (as evidenced by the disclosure of Heitkamp) to be a "standard low FST" for materials that meets a much lower standard than the "fireproof" standard of the FAA.

Claim terms must be given the meaning that a person having ordinary skill in the art would understand in light of the specification and the prior art. From the FAA standard, Heitkamp and the Applicant's own specification, the term "burn-through-proof" means that the materials meet or exceed the minimum standard for fireproofness established by the FAA (i.e. the test for 2000 degrees Fahrenheit for 15 minutes or better). The evidence provided by Applicant cannot be dismissed, and the Applicant respectfully requests that the Examiner reconsider the meaning of the claims in light of the overwhelming weight of evidence. A person having ordinary skill in the art would understand "burn-through-proof" within the claims to mean fireproof, as defined by the FAA and as disclosed by the test in Heitkamp for composite sandwich panel structures requiring fire or flame resistance or fire protection, which is identical to the FAA definition.

Fischer et al. (Item 7 of Advisory Action)

Applicant traverses the assertion that Fischer et al. can be read to disclose a "burn-through-proof" foil, as that term would be interpreted by a person having ordinary skill in the art in light of the FAA specifications, Heitkamp and the Applicant's specification. In column 3, lines 56-59, of Fischer, "...the layer-impregnating materials such as, for example, phenol resin and epoxy resin, plastics material films, ceramic films, sheet steel foils and others could also be used instead of aluminum foils;" however, according to Fisher et al., in relation to the aluminum foil, "...a thickness of between 0.02 mm and 0.05 may be used, so that its weight is not detrimental to the weight of the floor panel, or component part respectively." (Col. 3, lines 22-26). Fisher et al. recognizes that other foils might be used other than Aluminum foils, but Fischer et al. teaches the advantages of using Aluminum vis-à-vis steel, i.e. its known lighter

weight, for aircraft applications. Thus, the cited reference, itself, suggests that other materials may have a weight that is “detrimental to the weight of the floor panel.” No person having ordinary skill in the commercial aircraft industry would substitute a heavy material (e.g. steel) for much lighter one (e.g. aluminum), if the material is known to contribute to a substantial weight gain in a finished aircraft. Thus, the mention that steel might be used in some applications fails to disclose that it would be used in an application requiring light weight, such as in an interior panel of an aircraft passenger cabin. Therefore, Fischer et al. fails to disclose the use of a steel foil in an interior panel of a commercial aircraft passenger cabin.

Furthermore, even if steel foil were selected as a substitute for aluminum foil, there is no disclosure, teaching or suggestion of how thick the foil would be. Presumably, the steel foil would need to be even thinner than the aluminum foil in order to conserve weight. Even at the same thickness as the aluminum foil, a steel foil cannot be presumed to offer burn-through-proof protection at 2000 degrees Fahrenheit for 15 minutes.

Regardless, Fischer et al. fails to disclose, teach or suggest all of the limitations of claim 23, as now amended, even if a steel foil is substituted for the aluminum foil used in the examples of Fischer et al. Specifically, Fischer et al. fails to disclose the “at least one burn-through-proof barrier layer is adhesively sandwiched between of the at least two layers of the honeycomb body formations,” as recited in claim 23, as amended. Therefore, claim 23 is not anticipated by Fischer et al.

In addition, there is no reason to combine the teachings of Fischer et al. and any of the other references, because Fischer et al. teaches away from any rearrangement of the layers of its one example represented in the drawing of Fischer et al. Instead, Fischer et al. teaches that the phenol impregnated layers must be separated by the metal foil layer to prevent the phenol impregnated layers, which are the outermost, exposed layers, from damaging the load bearing layers, which are protected from chemical reactions that occur during curing of the phenol impregnated layers by the metal foil layer. This is the only embodiment that is enabled by the teachings of Fischer et al. in sufficient detail to enable a person having ordinary skill in the art to practice the embodiment. As discussed in the previous response, Fischer et al. is clear that the arrangement of the layers in this embodiment has significant advantages over the prior art.

Thus, no person having ordinary skill in the art would find it obvious to rearrange the layers of Fischer et al., taken alone or in combination with the other cited references.

Arrangement of Layers (Item 11 of the Advisory Action)

Fischer et al. fails to teach and suggest the arrangement of layers recited in claim 23, and claim 23 is nonobvious over Fischer et al., taken alone or in combination with any of the other references. Fischer et al. fails to teach or suggest an interior panel as recited in claim 23, as amended, in part:

...supported by and adhered to a cover layer such that the honeycomb panelling is formed of the at least two layers of the honeycomb body formation sandwiched between a top-supported cover layer facing the passenger cabin, and a bottom-supported cover layer facing a space on a side opposite to the passenger cabin, and the honeycomb panelling extends with the outer skin of the aircraft to follow the curvature of the outer skin... the cover layer is made of at least one carbon fiber reinforced plastics layers or at least one glass fiber reinforced plastics layer or both;

a burn-through-proof foil arranged such that the burn-through-proof foil conforms to an outer surface of the bottom-supported cover layer facing the space, and

at least one burn-through-proof barrier layer is adhesively sandwiched between two of the at least two layers of the honeycomb body formation.

The "at least one burn-through-proof barrier layer is adhesively sandwiched between two of the at least two layers of the honeycomb body formation, which is not disclosed in Fischer et al., and the burn-through-proof foil that conforms to the outer surface of the bottom supported cover layer facing the space is not disclosed in Fischer et al. Indeed, Fischer et al., fails to disclose any fireproof layers, whatsoever.

In addition, Fischer et al. fails to teach or suggest any fireproof layer between two honeycomb layers, whether taken alone or in combination with any of the other cited

references. Instead, Fischer discloses a particular arrangement of layers requiring a phenol prepreg layer (or other ablative, combustible outer layer), a metal foil and a structural layer. Even with this combination of layers, Fischer et al. teaches that the composite is merely flame and fume resistant (the low FST standard). Therefore, Fischer does not render anticipated or obvious the limitations of claim 23, as amended.

Claims 24-30, 33-39, and 43-46 depend from claim 23 including all of the limitations of claim 23 and additional limitations; therefore, all of these claims are neither anticipated nor obvious over Fischer et al., taken alone or in combination with any of the other cited references.

The Office Action

Now referring to the Office Action mailed January 16, 2009, the arguments in the previous response are reiterated. Fischer et al. specifically teaches away from epoxy rich carbon fibre layers as a flame resistant layer. Instead, the exposed layers in Fischer et al. are, in every instance, a comparatively resin depleted fibrous material, preferably impregnated with some phenol resin, but much less than would be required to make the layer a structural layer or a plastics layer. *See* the background of Fischer et al. and column 1, lines 24-44; column 1, line 60 to column 2, line 5; column 3, lines 45-51; column 3, line 60 to column 4, line 2 (low load of a phenol resin impregnation – metal layer – epoxy rich structural layer construction). Fischer et al. teaches that several serious problems with the prior art are overcome with this specific construction, and Fischer et al. offers no other arrangement of layers.

Now referring to Heitkamp, Heitkamp expressly teaches away from references such as Fischer et al. that use a phenol impregnated, combustible surface layer. Specifically, these are taught as being insufficient to achieve fireproofness. Thus, they are not burn-through-proof. No person having ordinary skill in the art would combine the teachings of Heitkamp and Fischer et al.

Arguendo, even if combined, these references fail to teach or suggest all of the limitations of the pending claims. Fischer et al. teaches that it is well known in the prior art to use carbon fibre reinforced sandwich panels, but that the epoxy and phenol resins used to form the matrix of these carbon fibre composite reinforced sandwich panels do not meet even the

standard low FST requirements of the FAA. *See* column 1, ll. 33-47, for both epoxy and phenolic resins. The invention of Fischer et al. is to combine, in order, the following: a low load phenolic impregnation of a fibrous material – a metal foil – an epoxy resin filled fibrous material. This presents a barrier to both smoke and flame according to the standard low FST of the FAA, but there is no teaching or suggestion that the construction would provide a fireproof barrier. Indeed, Heitkamp teaches away from any such suggestion. Therefore, even taking Fischer et al. and Heitkamp, together, no person having ordinary skill in the art would consider the teachings of Fischer et al. to modify the teachings of Heitkamp in the way suggested by the Office Action.

The combination of various teachings of various references and a website disclosing a specific material to cobble together a rejection of the claims uses improper hindsight reasoning. Essentially, the Office Action is suggesting that it would be obvious to try a combination of the teachings of the various references and the Sigrafil® reference, which is suggested to teach some advantages of a carbon fiber reinforced plastics material. But nothing in this reference or any of the other cited references teaches or suggests use of this material in the way suggested in the Office Action or as recited in the pending claims. The only reason to combine this reference with the other references is hindsight reasoning, because an unlimited number of materials could be chosen that would provide the same or better advantages as the material of this reference. Indeed, each of the other references cited teach the superiority of the materials chosen and/or synergistic effects for the particular combination of materials chosen. Thus, there is no direction to a person having ordinary skill within the prior art. Since the combinations and permutations of various materials known in the art for forming of composite honeycomb panels is infinite, the Applicant traverses the selection of one particular material out of a large variety of materials for which there is no particular reason to combine the material in the way suggested in the Office Action. Since all of the references cited teach the benefits of their own particular solution to the problem (and away from other known solutions), this is not the equivalent of the situation in *KSR* where the skilled artisan was merely pursuing “known option” from a “finite number of identified, predictable solutions” to achieve a predictable result. Instead, each of the cited references teaches a completely different solution that requires a specific combination of elements in a specific sequence to achieve unpredictable

and synergistic benefits as taught by the various references. Composite panel fabrication remains mostly an art rather than a science, and getting a new composite material rated for use in passenger aircraft is a long and grueling ordeal that is inherently unpredictable. No person having ordinary skill in the art will pursue a particular direction without a strong motivation and a reasonable expectation of success. According to a recent case, *In re Kubin*, Case No. 2008-1184, (Fed. Cir. 2009), it is impermissible hindsight when "...what would have been 'obvious to try' would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where prior art gave ... no direction as to which of many possible choices is likely to be successful." This is the case with the improbable selection of materials and the sequence of those materials suggested in the Office Action, which combines references that each teach a unique combination of features to achieve an unexpected result. As a result, the rejection is based on impermissible hindsight reasoning.

Certainly, claims 40-42, which recite: "...wherein the at least two carbon fiber reinforced plastics layers are arranged on opposite sides of the plurality of honeycombs, such that at least one of the at least two carbon fiber reinforced plastics layers is disposed on the outermost top face of at least one of the honeycomb bodies and at least one of the at least two carbon fiber reinforced plastics layers is disposed on the outermost bottom face of at least one of the honeycomb bodies, without any metal layers," are nonobvious over Fischer et al., taken alone or in combination with any of the other references. Fischer et al. teaches away from carbon fiber reinforced plastics layers exposed on the outermost faces. A low load phenol impregnated fibrous layer, which Fischer et al. uses as the external most layer, is not a carbon fiber reinforced plastics layer (CFK) as that term is known in the art to a person having ordinary skill in the art. Also, Fischer et al. fails to teach or suggest any burn-through-proof layer, whatsoever, and Fischer et al. teaches away from a steel foil (or any heavier foil) for applications requiring light weight, such as in aircraft construction, teaching the advantages of aluminum, instead. Thus, no person having ordinary skill in the art would combine the teachings of Fischer et al. with the other references in the way suggested by the Office Action.

Now referring to claim 25, claim 25 is nonobvious over all of the cited references, because none of the cited references teach or suggest an interior panel comprising a honeycomb body formation, wherein "an inner cover layer adhered to the opposite end of the cross section

of each of the at least two honeycomb body formations is made of carbon fiber reinforced plastics such that the at least two layers of the honeycomb body formation adhesively sandwiches the respective inner cover layers between the at least two layers of the honeycomb body formation forming the at least one burn-through-proof barrier layer.” Instead, Fischer et al. teaches away from carbon fiber reinforced plastics as a barrier layer, and Heitkamp teaches that a vermiculite or other inorganic layer other than a carbon fiber reinforced plastics layer is needed to provide a barrier layer. Therefore, claim 25 is now in condition for allowance.

Now referring to claim 26, claim 26 is nonobvious over all of the cited references, because none of the cited references also teach or suggest an interior panel, “...wherein the honeycomb panelling includes more than two of the at least two layers of the honeycomb body formation, each of the more than two of the at least two layers adhesively sandwiching the respective inner cover layers made of carbon fiber reinforced plastics between adjacent ones of the more than two of the at least two layers in series, wherein two of the inner cover layers which are adjacent to each other and lying one on top of the other are glued one to the other.” As stated in the Office Action, Heitkamp teaches that its invention includes components that each “plays a synergistic part in the overall design and construction” on page 7, lines 33-36, which means that no person having ordinary skill in the art would be able to vary the synergistic construction of Heitkamp in the way suggested in the Office Action without sacrificing the synergistic benefits taught by Heitkamp. Regardless, claim 26 has additional limitations not disclosed by any of the references cited, and Heitkamp teaches away from phenolic composite layers and the teachings of Fischer et al. for barrier layers, teaching certain inorganic materials and fibers as a barrier layer, instead. Thus, a person having ordinary skill in the art, familiar with the teachings of Heitkamp, would select one of the inorganic barrier layers of Heitkamp to achieve a burn-through-proof layer and not the teachings of Fischer et al., which fail to achieve fireproofness according the industry’s definition of fireproof (as codified by the FAA and disclosed in Heitkamp).

Now referring to claim 33, claim 33 is nonobvious over the cited references, because the interior panel of claim 33 includes a plurality of carbon fiber reinforced plastic layers that “...are of a burn-through-proof plastic foil.” None of the references teach or suggest a burn-

through-proof plastic foil that forms a plurality of carbon fiber reinforced plastic layers; therefore, claim 33 is nonobvious over the cited references.

Now referring to claim 34, claim 34 is nonobvious over all of the cited references, because none of the cited references teach or suggest "...an adhesive bond between each of the at least two layers of the honeycomb body formation and the respective cover layer is implemented using a burn-through-proof adhesive." The Office Action suggest only a phenol or an epoxy as the adhesive, but neither teaches or suggest a burn-through-proof adhesive.

Now referring to claim 36, claim 36 is nonobvious because none of the cited references teach the insulation package having the limitation as recited in claim 36 "...arranged on the bottom-supported cover layer facing the space on the side opposite to the passenger cabin, the bottom-supported cover layer being made of a glass fiber reinforced plastics layer or a carbon fiber reinforced plastics layer wherein the insulation package comprises a burn-through-proof insulation or a combustible glass fiber reinforced plastics insulation into which a burn-through-proof barrier layer is integrated, and extends, without interruption, through the carbon fiber reinforced plastics insulation right to the circumference of the insulation." Indeed, none of the cited references teach or suggest such a combination, either alone or in combination.

Now referring to claims 37-39 and 44-46, the specific arrangement of the threaded drill hole and the hole-like leadthroughs are nonobvious over the cited references, because the M.C. Brady reference fails to teach or suggest a drill hole that does not extend through a burn-through-proof panel and a burn-through-proof connection element, which must include not only a material that doesn't burn, but also one that doesn't conduct heat that would cause ignition of materials in contact with the connection element on the opposite side of the drill hole from the fire. M.C. Brady fails to teach a system that is burn-through-proof, either alone or in combination with the other cited references. These commonly known means of mounting honeycomb panelling do not prevent heat from being conducted along the connecting elements, igniting materials in contact with the connecting elements. Therefore, the Applicant traverses the rejections commencing on page 10 of the Office Action at paragraphs 33-36, which merely recite known fasteners that are incapable of preventing heat transfer to the opposite side of the connectors.

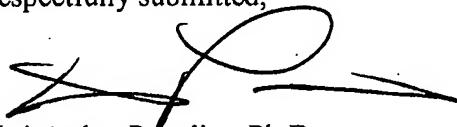
Now referring to claims 40-41, these claims are nonobvious over Chee et al., because a fair reading of Chee et al. clearly teaches away from the specific examples in Chee et al. cited by the Office Action. Specifically, claim 40 recites "...wherein the at least two carbon fiber reinforced plastics layers are arranged on opposite sides of the plurality of honeycombs, such that at least one of the at least two carbon fiber reinforced plastics layers is disposed on the outermost top face of at least one of the honeycomb bodies and at least one of the at least two carbon fiber reinforced plastics layers is disposed on the outermost bottom face of at least one of the honeycomb bodies...." Figure 4, panel no. 23 and Figure 6, panels A1 and A2 are cited as examples from Chee et al., but Chee et al. teaches away from these examples. On page 17, lines 19-26, Chee et al. teaches that the panels of type A form Figure 6 "...did not meet even minimal fireproof criteria." Thus, no person having ordinary skill in the art would implement the panels A1 and A2 (of type A) from Figure 6, when Chee et al. teaches that other solutions performed much better. This comparison, in fact, teaches away from the type A panels, and teaches that the type A panels are not fireproof. Likewise, page 16, lines 1-28 teaches away from carbon fibers and the HRH-10 honeycomb core of Figure 4, panel no. 23. The reference teaches that the epoxy matrix face sheet, such as that of panel no. 23, "...was totally consumed on the hot side in about four minutes, and cold side damage was extensive." In contrast, the ceramic fiber face sheets with other polymer matrix materials "degraded or ablated at a much slower rate than the epoxy matrix systems" such as that of panel no. 23. For these reasons, no person having ordinary skill in the art would have a reasonable expectation of success using the example disclosed in Figure 4, panel no. 23 and the type A panels of Figure 6. Instead, the Chee et al. reference actually teaches away from the limitations of the pending claims.

All of the pending claims are now in condition for allowance. No new matter has been added by any of the amendments, which are fully supported by the drawings and the detailed description of the invention.

Entry of the amendments and allowance of all of the pending claims is respectfully requested.

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Respectfully submitted,



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